

A Case Report of Mesenteric Ischemia After COVID-19 Vaccination

Sean Christopher Gaudio¹, Frank Eugene Gaudio^{2,*}

¹School of Medicine, Georgetown University, Washington, the United States

²Emergency Department, the Washington Health System, Washington, the United States

Email address:

gaudioemsp@hotmail.com (F. E. Gaudio)

*Corresponding author

To cite this article:

Sean Christopher Gaudio¹, Frank Eugene Gaudio. A Case Report of Mesenteric Ischemia After COVID-19 Vaccination. *Journal of Surgery*. Vol. 9, No. 4, 2021, pp. 216-219. doi: 10.11648/j.js.20210904.23

Received: July 21, 2021; **Accepted:** August 6, 2021; **Published:** August 31, 2021

Abstract: The United States has vaccinated almost 200 million citizens in the first 7 months of 2021. During that period adverse events have been described from minor complaints of redness, pain and swelling at the injection site to more serious events such as Guillain Barre Syndrome and thrombosis. As vaccination distribution continue to move forward, more side effects and complications will become evident. This case report is of a patient presenting in shock 4 days after receiving her second COVID-19 vaccination with altered mental status, dyspnea, and an acute abdomen with a bowel perforation. After resuscitation, the patient was taken to surgery where an additional diagnosis of embolic mesenteric arterial ischemia was made on exploratory laparotomy. While a causal relationship between the vaccine and the findings in this particular patient cannot be proven, there certainly is a temporal relationship between her receiving the Pfizer-BioNTech (BNT162b2) COVID-19 vaccine, the presentation of this patient to our institution, and the findings during emergency surgery. Thromboses are known adverse events from the COVID-19 vaccines however to our knowledge, there has not been a published case report of embolic mesenteric arterial ischemia after receiving a COVID-19 vaccine. Appreciating the association between COVID-19 vaccines and embolic mesenteric arterial ischemia should alert physicians to keep this diagnosis high on their differential in the setting of unusual abdominal pain and recent vaccination.

Keywords: Pfizer-BioNTech COVID-19 Vaccine, COVID-19 Vaccine Adverse Event, Mesenteric Ischemia

1. Introduction

Our institutional experience during the severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2) outbreak, has been noted for patients with multiple complications from COVID-19 as well as side effects and complications from the different vaccines which have been administered to patients. The United States has fully vaccinated almost 164 million people and partially vaccinated another 26 million in the first 7 months of 2021 [1]. During that period, adverse events have been described from the three COVID-19 vaccines approved for emergency use in the United States include pain, redness, and swelling at the injection site as well as general malaise, general myalgias, fatigue, fever, chills, and nausea. More serious reported adverse events of the vaccines include anaphylaxis, Guillain Barre Syndrome, pericarditis,

myocarditis, and thrombosis [2]. As vaccination distribution moves forward, more side effects and complications will become evident and reported to the Vaccine Adverse Event Reporting System (VAERS) [3]. There are many reports of venous thrombosis as a result of COVID-19 vaccines. This case report highlights a patient presenting with altered mental status, acute dyspnea, and an acute abdomen who was diagnosed with mesenteric ischemia, necrosis, and bowel perforation. While a causal relationship between the vaccine and the findings in this particular patient cannot be proven, there is certainly a temporal relationship between her receiving the Pfizer-BioNTech (BNT162b2) COVID-19 vaccine, the presentation of this patient to our ED, and the findings during emergency surgery. Embolic mesenteric arterial ischemia after receiving a COVID-19 vaccine is a previously unreported adverse event. While mesenteric

ischemia is uncommon, when unrecognized and untreated, it results in intestinal necrosis which carries a significant morbidity and mortality.

2. Case Report

A 57 year-old female presented to the Emergency Department (ED) with a past medical history of asthma, hepatitis C, and bipolar disease, after receiving a second dose of the Pfizer vaccine 4 days prior to arrival. The family stated that two days after receiving the vaccine, she demonstrated some confusion and complained of abdominal pain, nausea, vomiting, and diarrhea. On the day of presentation, she became somewhat more confused, agitated, seemed to be short of breath, and was very diaphoretic. Emergency Medical Services was activated and on their arrival the patient was unable to give a history or cooperate with an examination. Paramedics were unable to obtain vital signs but she was noted for a thready pulse and diaphoresis. They did initiate an IV and placed high flow oxygen via a non-rebreather mask.

On arrival in the ED, she remained confused and frantic, unable to give any history. Her vital signs were; blood pressure 82/60mmHg, heart rate 147, respiratory rate 30, pulse ox 92% on high-flow oxygen, and rectal temperature was 102.5 degrees. Examination revealed an agitated female, writhing about on the stretcher, skin was warm and very diaphoretic, pupils were 5 millimeters and reactive. HEENT were unremarkable. Neck was supple and non-tender without meningismus. Chest was noted for tachypnea and accessory muscle use, lungs were auscultated for rhonchi bilaterally, right much greater than left. Cardiac exam revealed a tachycardia without murmur. Abdomen was slightly distended, tympanitic, with diffuse tenderness and guarding.

3. Clinical Course in the Emergency Department

The patient had a 2nd IV initiated and she was endotracheally intubated with video laryngoscopy after being given etomidate. During the intubation the patient was suctioned for copious amounts of coffee-ground material coming from her esophagus which was heme-positive and a nasogastric tube (NGT) was inserted. Propofol was used for sedation after the intubation. A third IV was initiated, a blood glucose was 266, and an ABG was pH 7.34/pCO₂ 35/pO₂ 77 on a FiO₂ of 100%. A chest X-ray showed the endotracheal and NGT to be in good position along with a right lower lobe infiltrate.

At this point, the patient was treated presumptively as sepsis from either pneumonia or a GI catastrophe with IV crystalloid fluid, acetaminophen, ciprofloxin, metronidazole, and pantoprazole. The patient was sent for non-contrast CT of head, chest, abdomen, and pelvis. The CT brain demonstrated an asymmetric hypodensity in the left centrum semiovale consistent with an age-indeterminate stroke. The

pertinent chest and abdominal CT results were bilateral pulmonary infiltrates, right greater than left, an infiltrative process in the mid-abdominal mesentery, no evidence of splanchnic vein thrombosis, and diffuse free air in the peritoneum seeming to emanate from the terminal ileum or right sigmoid. The patient's white blood count, hemoglobin, platelets, electrolytes, and urinalysis were normal. Her rapid COVID-19 antigen test was negative and the PCR test subsequently was also negative. The abnormal labs were creatinine 1.3 (normal<1.1), troponin 0.21 (normal<0.04), lactate of 84, PT/INR 13.3/1.2 (reference range 10-12/0.8-1.1), and a right shift differential on a normal WBC of 58% lymphocytes and 40% monocytes.

Despite aggressive fluid resuscitation (30 mls/kg) her blood pressure began decreasing and nadired at 60mmHg systolic. Propofol was discontinued, norepinephrine was instituted, and her blood pressure did rebound to 75 systolic pre-operatively. Surgery was consulted and took her emergently to the operating room for an exploratory laparotomy.

4. Surgical Findings and Post-Operative Course

Black ascites was found upon opening the peritoneum along with a small bowel perforation and diffuse, patchy, ischemic small and large bowel. The surgeon felt these findings were consistent with "shower emboli". Injecting indocyanine green (ICG) failed to show enough highlighted, viable tissue to achieve a successful anastomosis after excising the perforation and non-viable bowel therefore the patient's abdomen was closed, she was admitted to hospital as "comfort care only", and expired within the next 6 hours.

5. Discussion

Common complications of COVID-19 infections are well reported in the literature including pneumonia, ARDS, sepsis, myocarditis, and kidney failure. Thrombotic complications and coagulation disorders have also been described such as deep vein thrombosis, pulmonary embolism, cerebral sinus thrombosis, ischemic stroke, myocardial infarction, systemic arterial embolism, and acute mesenteric ischemia [4]. Complications in vaccine recipients from the three COVID-19 vaccines approved for emergency use in the United States included minor local adverse events in 58-83% (pain, redness, and swelling at the injection site), systemic side effects in 25-47% (general malaise, general myalgias, fatigue, fever, chills, and nausea), and allergic reactions varied from 2 per million for anaphylaxis to 1.7% for skin rashes. The most serious adverse events (thrombosis, Guillain Barre Syndrome, pericarditis, and myocarditis) were rare, approximately 22 per million vaccinations, but real. [5-9].

In March of 2021 use of the AstraZeneca vaccine was halted in Europe due to concerns about acute arterial and venous thromboses in the cerebral venous sinuses. There

were also reports of thrombosis in the portal, splanchnic, or hepatic veins. US health authorities recommended a pause in the use of the Johnson & Johnson vaccine because of blood clotting reports [10]. A National Institutes of Health National Library of Medicine (NIH/NLM) PubMed search of COVID-19 vaccine and acute mesenteric ischemia did not reveal any case reports or articles on the subject [11]. We believe that acute mesenteric arterial ischemia resulting in necrotic bowel and perforation is a new adverse event of the Pfizer COVID-19 vaccine, as demonstrated in this patient.

Coronavirus infections result in a prothrombotic state by several mechanisms including endothelial damage, antibody activity against anti-platelet factor 4, and cytokine storm. Similarly, a syndrome of vaccine-induced immune thrombotic thrombocytopenia (VITT) has been described in 23 healthy young patients immunized with the first dose of the ChAdOx1 nCoV-19 vaccine (AstraZeneca) as defined by thrombocytopenia, high levels of antibodies to platelet factor 4 (PF4)-polyanion complexes in the absence of heparin use, and atypical thrombocytopenic thrombotic events [12]. In another report of 5 patients with thrombosis (4/5 had cerebral vein thrombosis), high levels of antibodies to PF4-polyanion complexes were detected and felt to not be related to heparin. This syndrome, which occurred after AstraZeneca vaccination, appears to be similar to autoimmune thrombotic heparin-induced thrombocytopenia [13]. Our patient however, was not thrombocytopenic and we did not confirm antibodies to PF4 with an enzyme-linked immunosorbent assay.

A prothrombotic state, from any etiology, can result in thrombosis or embolic events anywhere in the circulatory system including the mesentery, both arterial and venous. Acute mesenteric ischemia has an incidence of <0.2% of all surgical admissions [14]. The superior mesenteric artery (SMA), which supplies the entire small intestine, ascending colon and the proximal transverse colon, has a large diameter, emanates from the aorta at an acute angle, and runs parallel to the aorta making an easy path for emboli to follow. Low flow in the mesenteric vasculature leads to mediator release, inflammation, infarction and subsequent bowel wall perforation. Early diagnosis is paramount because a pre-infarction diagnosis mitigates mortality and morbidity while a post-infarction diagnosis has a peri-operative mortality that approaches 70-100% [15]. Treatments options are somewhat dependent on the diagnostic mode and the patient's premorbid state. If the ischemia is found early on angiography, local instillation of vasodilators or thrombolytics can be used while a late in-vivo surgical diagnosis, after necrosis has occurred, typically results in embolectomy, revascularization, and bowel resection. In selected patients whose advanced age and co-morbidities are harbingers of a complicated post-operative course, endovascular strategies such as percutaneous embolectomy, balloon thrombectomy, percutaneous transluminal angioplasty, and primary SMA stenting have become more appealing. Aggressive fluid resuscitation, hemodynamic stabilization, and other supportive measures are also part of the treatment process.

6. Conclusion

Thrombosis is a known complication of COVID-19 infections and is also an adverse event after receiving a COVID-19 vaccine. This is the first report describing embolic mesenteric arterial ischemia in a patient 4 days after receiving the Pfizer COVID-19 vaccine which resulted in bowel necrosis, perforation and death in our patient. While the mechanism of these events after the vaccination is not well known, understanding that there is an association between the COVID-19 vaccines and embolic mesenteric arterial ischemia can hopefully prompt practitioners to keep a high index of suspicion in the setting of acute, severe abdominal pain with a paucity of abdominal exam findings and recent vaccination. Considering mesenteric arterial ischemia in the appropriate patient will hopefully shorten the time to diagnosis and restoration of blood flow which are paramount factors in mitigating morbidity and mortality. Regrettably, even in the best of circumstances with prompt diagnosis, fluid resuscitation, restoration of blood flow, surgical resection of necrotic bowel, and supportive measures, acute mesenteric arterial ischemia is a surgical emergency with frequent catastrophic outcomes.

References

- [1] "COVID-19 Vaccinations in the United States." *CDC website*, 27 July, 2021, www.covid.cdc.gov/covid-data-tracker/#vaccinations.
- [2] "Selected Adverse Events Reported after COVID-19 Vaccination." *CDC website*, 20 June, 2021, www.cdc.gov/coronavirus/2019-ncov/vaccines/safety/adverse-events.html#:~:text=Results%20from%20monitoring%20effor,ts%20are,COVID%2D19%20vaccination.
- [3] "Vaccine Adverse Event Reporting System." *VAERS website*, 20 July, 2021, www.vaers.hhs.gov/.
- [4] Singj, Balraj. "COVID-19 and Acute Mesenteric Ischemia: A Review of Literature." *Hematol Transfus Cell Ther*. 2021; Jan-Mar; 43 (1) 112-116.
- [5] "Safety of COVID-19 Vaccines." *CDC Website*, 12 July, 2021, www.cdc.gov/coronavirus/2019-ncov/vaccines/safety/safety-of-vaccines.html.
- [6] "Data reveal fewer real-world COVID vaccine side effects." *Center for Infectious Disease Research and Policy*, 28 April, 2021, www.cidrap.umn.edu/news-perspective/2021/04/data-reveal-fewer-real-world-covid-vaccine-side-effects.
- [7] "How Common Are Your COVID-19 Vaccine Side Effects?" *Smithsonian Magazine*, 4 May, 2021, www.smithsonianmag.com/smart-news/find-out-how-common-your-covid-19-vaccine-side-effects-are-180977656/.
- [8] Menni, Cristina. "Vaccine side-effects and SARS-CoV-2 infection after vaccination in users of the COVID Symptom Study app in the UK: a prospective observational study", *Lancet Infect Dis* 2021; 21: 939-49, Published Online April 27, 2021, [https://doi.org/10.1016/S1473-3099\(21\)00224-3](https://doi.org/10.1016/S1473-3099(21)00224-3).

- [9] Bikdeli B, et al. "Cerebral Venous Sinus Thrombosis in the US Population, After Adenovirus-Based SARS-CoV-2 Vaccination, and After COVID-19." *J Am Coll Cardiol* 2021; Jun 8.
- [10] Williams, Shawna. "Blood Clot Risk from COVID-19 Higher than After Vaccines: Study," *The Scientist*. April 16, 2021. www.the-scientist.com/news-opinion/blood-clot-risk-from-COVID-19-higher-than-after-vaccines-study-68675.
- [11] PubMed Website search for COVID-19 vaccine and mesenteric ischemia, www.pubmed.ncbi.nlm.nih.gov/?term=COVID+vaccine+and+mesenteric+ischemia&schema=all.
- [12] Marie Scully, M. D. "Pathologic Antibodies to Platelet Factor 4 after ChAdOx1 nCoV-19 Vaccination." *NEJM*. 2021; 384: 2202-2211, DOI: 10.1056/NEJMoa2105385.
- [13] Nina H. Schultz, M. D., Ph.D. Thrombosis and Thrombocytopenia after ChAdOx1 nCoV-19 Vaccination. *NEJM*. 2021; DOI: 10.1056/NEJMoa2104882.
- [14] Bala, M. *et al.* "Acute mesenteric ischemia: guidelines of the World Society of Emergency Surgery." *World J Emerg Surg* 12, 38 (2017). <https://doi.org/10.1186/s13017-017-0150-5>.
- [15] Oldenburg, W. A. et al. Acute Mesenteric Ischemia: A Clinical Review, *Arch Intern Med*. 2004; 164 (10): 1054-1062. DOI: 10.1001/archinte.164.10.1054.